

REMARKS

The present document is submitted in reply to the office action dated January 9, 2009 ("Office Action").

Applicants have amended claims 14, 16, 19, and 45 to more particularly point out the subject matter they deem as their invention. Support for the amendments can be found in the specification at page 3, lines 14-15, page 6, lines 10-12, and page 7, lines 21-24, and also in original claims 16 and 19. Finally, Applicants have cancelled claims 51 and 52. No new matter has been introduced.

Claims 14-16, 18-20, 31-36, and 45-50 are currently pending and under examination. Applicants respectfully request that the Examiner reconsider this application in view of the following remarks.

Rejections under 35 U.S.C. § 112

Claims 14-16, 18-20, 31-36, and 45-52 are rejected for lack of enablement. See the Office Action, pages 3-4. More specifically, the Examiner holds that one could not perform the fermentation processes recited in previously presented claims 14 and 45 (both independent) to produce a product containing 13.5% and 10.5% ethanol required by these two claims, respectively, if the starting material (i.e., the glucose-rich syrup recited in both claims) contains less than 105 mg/ml glucose. See the Office Action, page 3, second paragraph. Applicants have cancelled claims 51 and 52.

Applicants have amended claim 14 to remove the recitation "to produce a fermentation product containing 13.5% ethanol." Thus, the Examiner's ground for rejection is no longer applicable to this claim, and claims 15, 16, 18-20, and 31-36, all of which depend from claim 14 and do not include the just-quoted recitation.

Turning to claim 45, Applicants have amended this claim to specify that the glucose concentration in the glucose-rich syrup ranges from 105 mg/ml to 114 mg/ml, which is not less than 105 mg/ml. It is submitted that this amendment has obviated the rejection of claim 45.¹ As the Examiner relies on the same ground to reject claims 46-50,

¹ Applicants have also amended this claim so that now it depends from claim 14.

which depend from claim 45, this amendment has also obviated the rejection of these dependent claims.

In view of the above remarks, Applicants respectfully request withdrawal of this rejection.

Rejections under 35 U.S.C. § 103

Claims 14-16, 18-20, 31-36, and 45-52 are rejected for obviousness over Seidman et al (“Seidman”) in view of Skory et al. (“Skory”). See the Office Action, pages 4-9. Note that claims 51 and 52 have been cancelled.

Amended claim 14 will be discussed first. This claim covers a method of producing a fermentation product from a starch-containing produce, including a dual-enzyme digestion process to produce a glucose-rich syrup and a subsequent fermentation process of **growing a microorganism in the glucose-rich syrup** to produce a fermentation product. In other words, the claimed method requires that the glucose-rich syrup obtained from the dual-enzyme digestion process be **used directly** for growing a microorganism.

Seidman teaches a dual-enzyme process for converting starch to low molecular weight-saccharides such as dextrose and maltose. See column 3, lines 51-54. As correctly pointed out by the Examiner, this reference does not teach “the step for producing ethanol by fermentation (see the Office Action, page 5, third paragraph), e.g., the growing step recited in amended claim 14.

Starch is a polysaccharide composed of a number of glucose units joined together by glycosidic bonds. A skilled person in the art would have known that the product obtained from Seidman’s dual-enzyme process, which uses starch as the starting material, contains only low molecular weight sugars (a carbon source). As microorganisms require various nutrients (e.g., a nitrogen source) to grow, a skilled artisan would have also known that the Seidman’s product, containing only sugar, CANNOT be used directly to grow a microorganism as it lacks other nutrient sources necessary for microorganism growth. In short, Seidman does not suggest growing a microorganism in a product obtained from Seidman’s dual-enzyme process, a step included in the method of amended claim 14.

The Examiner correctly pointed out that Skory teaches “a fermentation process of simple sugars (glucose) using *Aspergillus oryzae* to product ethanol ...” See the Office Action, page 5, fourth paragraph. This reference also teaches growing microorganisms in a medium containing various nutrient sources other than sugars. See page 203, right column, last paragraph [“Nineteen *Aspergillys* and ten *Rhizopus* 9see Tables 1 and 2] were grown on YPM (0.3% yeast extract, 0.5% peptone, and 0.3% malt extract) supplemented with glucose, xylose, cellobiose, or cellulose”] Clearly, Skory would have discouraged a skilled artisan from growing a microorganism in a medium containing only sugar, e.g., the Seidman product. In other words, this reference does not cure the deficiency of Seidman.

For the reasons set forth above, Applicants submit that claim 14, as amended, is not obvious over Seidman in view of Skory. Nor are claims 15, 16, 18-20, 31-36, and 45-50, all dependent from claim 14, directly or indirectly.^{2,3}

² Applicants would like to point out an additional reason that claims 45-50 are not obvious over Seidman in view of Skory. Claim 45 will be discuss first. This claim, dependent from claim 14, further requires that the glucose-rich syrup, containing 105-114 mg/ml glucose, be fermented by a particular microorganism, i.e., *Aspergillus oryzae*, for **three days** to obtain a fermentation product containing **10.5%** ethanol or for **five days** to obtain a fermentation product containing **13.5%** ethanol. As pointed out above, Seidman does not mention at all fermentation of a glucose-rich syrup with a microorganism. Skory teaches that *Aspergillus oryzae* produces **1.59-2.44 %** ethanol in a **6-day** fermentation period, using glucose (50 g/L) as the carbon source. See Table 1 at page 204. To simplify discussion, Applicants assume that ethanol production is proportional to the concentration of the carbon source. Thus, according to Skory, using *Aspergillus oryzae* to ferment glucose at a concentration of 100 mg/ml (close to that required by the method of claim 45) in **6 days** would produce at **best 4.88 %** ethanol. This ethanol concentration is far lower than that produced by the method of claim 45, i.e., **10.5% in 3 days** or **13.5% in 5 days**. Skory further teaches that glucose is the best carbon source to produce ethanol as compared with other sugars, i.e., xylose and cellulose. See Table 1. In view of the above information, a skilled person in the art would have readily recognized that the outcome of the claimed method, i.e., a high ethanol concentration obtained in a short fermentation period, is clearly an **unpredictable** improvement in view of Sideman and Skory. As set forth in MPEP § 2141, “[w]hen considering obviousness of a combination of known elements, the operative question is [] ‘whether the **improvement is more than the predictable** use of prior art elements according to their established functions,’” citing *KSR v. Teleflex*, 127 S. Ct. 1727, 1740. Pursuant to the guideline set forth in MPEP § 2141 and quoted above, amended claim 45 is not obvious in view of these two references. Nor are claims 46-52, all of which depend from claim 45.

³ For a complete record, Applicants address below why claims 14-16, 18-20, 31-36, and 45-50 are also not obvious over Seidman in view of Iwano et al. (“Iwano”), a prior art reference cited previously. Seidman has been discussed above. According to the Examiner, Iwano discloses a fermentation process for producing Japanese sake. See the Office Action dated May 14, 2008, page 4. Like Skory, Iwano also does not suggest growing a microorganism in a medium containing only sugar. Thus, for the same reasons set forth above, Seidman and Iwano, taken together, do not render these claims obvious.

CONCLUSION


In view of the above remarks, Applicants submit that this application is now in condition for allowance. A favorable consideration is therefore respectfully solicited.

It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

The Extension of Time fee in the amount of \$130 is being paid concurrently herewith on the Electronic Filing System (EFS) by way of Deposit Account authorization. Please apply any charges to Deposit Account No. 50-4189, referencing Attorney Docket No. 70002-104001.

Respectfully submitted,

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Y. Jenny Chen, Ph.D., J.D.
Attorney for Applicants
Reg. No. 55,055

Customer No. 69713
Occhiuti Rohlicek & Tsao LLP
10 Fawcett Street
Cambridge, MA 02138
Telephone: (617) 500-2511
Facsimile: (617) 500-2499
72817.doc